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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of
Kenji, Nagai
App. No.: 09/682642
Filed: October 1, 2001
Conf. No.: 3686
Title: STARTER MOTOR FOR
INTERNAL COMBUSTION
ENGINES
Examiner: D. Le
Art Unit: 3686
Commissioner for Patents
P.O. Box 1450
Arlington, VA 22313-1450

I hereby certify that this correspondence and all
marked attachments are being deposited with
the United States Patent Office via fax to
(703) 872-9319 on:

August 9, 2004

Ernest A. Beutler
Reg. No. 19901

Dear Sir:

APPELLANT'S SUBSTITUTE BRIEF

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that would have a bearing on or be affected by the decision in this appeal.

REAL PARTY IN INTEREST

In addition to the inventor, the real party in interest is his assignee, Kabushiki Kaisha Moric, a Japanese corporation.

STATUS OF CLAIMS

Claims 1, 10-19, and 23-30 are before the Board on Appeal. Remaining claims 2-9 and 20-22 are held non-elected on the basis of a rather dubious "restriction" or "election" basis which is not before the Board. A clean copy of the claims on appeal appears in the Appendix to this brief.

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STATUS OF AMENDMENTS

This case was appealed on February 13, 2004 and Appellant April 3, 2004. In response to that Brief the Examiner reopened prosecution on May 19, 2004 and withdrew the previous rejections under 35 USC 103(a) and issued several new rejections both under 35 USC 102(b) and 35 USC 103(a). Appellant was given the opportunity of filing an amendment in response to these two new grounds of rejection or requesting reinstatement of the appeal and filing a substitute brief. Appellant has chosen the latter and this constitutes the substitute brief. Thus the claims before the Board, as presented in clean form in the Appendix are the claims as rejected in the appealed rejections.

APPELLANT'S INVENTION

Appellant's invention relates to an electric motor that is used as a starter motor for internal combustion engines. As is noted in the Background portion of appellant's specification, in a conventional type of starter motor the rotor shaft of the motor extends through one of two end caps and is in driving relationship through a one way clutch with an associated device such as the flywheel of an internal combustion engine. Because the end of the rotor shaft, which drives the engine shaft for starting purposes, is more highly loaded, it is the common practice to use an anti-friction bearing such as a roller or ball bearing at this end of the shaft. The other end of the shaft, which normally is more lightly loaded, is journaled in the remaining end cap by a plain bearing. In addition, the commutator is normally positioned at the end of the rotor adjacent the driving shaft end thereof. This means that the motor coil winding and the cooperating permanent magnets are spaced axially from the anti-friction bearing. This causes an increased loading on the plain bearing. Also vibrations will occur that adversely affect both bearings. This is particularly a problem because the plain bearing end of the rotor shaft is normally cantilevered. That is only the drive end of the outer housing is affixed to the associated internal combustion engine.

Thus in accordance with a first feature of the invention, the commutator and brushes are relocated from the conventional position to the end of the rotor shaft spaced from its driving end and closer to the plain bearing. This permits the coil windings and permanent magnets to be moved closer to the antifriction bearing.

The cantilevered mounting of conventional starter motors also gives rise to considerable vibrational loads and resulting stresses on the plain bearing. Thus in accordance with a further feature of the invention, the second end cap is formed with reinforcing ribs and an arrangement that permits its direct attachment to the body of the engine being started.

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ISSUES BEFORE THE BOARD

The first issue before the Board is whether the subject matter of Claims 1 and 16 are anticipated under 35 USC 102(b) by US Patent 4,665,320 (DeBello).

The second issue before the Board is whether the subject matter of Claims 1, 10-13, 16 and 17 are anticipated under 35 USC 102(b) by US Patent 5,353,658 (Nagashima et al).

A third issue before the Board is to determine if the subject matter of Claims 14, 15, 18, 19, and 30 is obvious under 35 USC 103(a) on the combination of Nagashima et al in view of US Patent 4,897,571 (Isozumi).

A fourth issue before the Board is to determine if the subject matter of Claims 23- 25 is obvious under 35 USC 103(a) on the combination of Nagashima et al in view of Isozumi, as applied against claim 19 in further view of US Patent 4,618,790 (Kakuda et al).

A fifth issue before the Board is to determine if the subject matter of Claims 26-29 is obvious under 35 USC 103(a) on the combination of Nagashima et al in view of Isozumi and Kakuda et al as applied against claim 25 in further view of US Patent 5,742,110 (Hefner).

GROUPING OF THE CLAIMS

The following groups of claims stand or fall together:

Claims 1, 16 and 17

Claims 10 and 11

Claims 12 and 13

Claims 14 and 18

Claims 15 and 19

The patentability of each of these groups and the remaining claims will be argued separately.

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APPELLANT'S ARGUMENTS

At the outset of this second brief in this case, appellant's attorney would like to state that the Examiner is clearly frustrated in his inability to find real support for any valid rejection of the claims directed to an invention that may appear obvious in retrospect, but is in fact elegant in its simplicity. After previously having rejected the claims under 35 USC 103 and having appellant file a brief contesting these rejections, the Examiner has now apparently made a further search and now rejects the two independent claims as being anticipated by either of two previously uncited references. The Examiner is still incorrect in his position.

Since the rejection is under 35 USC 102, all that is necessary is to compare the claim language with the disclosure of the references. However before doing so appellant would like to again state the problem confronting the prior art where the conventional practice with starter motors deals with the support of the starter motor shaft ends with an antifriction bearing such as a ball or roller bearing at the end where it engages the shaft of the engine being started and a plane bearing at the other, more lightly loaded end. In addition these conventional starter motors are connected to the body of the engine being started through the starter motor end plate through which the starter motor shaft end extends.

This construction presents structural problems that appellant solves in two ways. As stated above, in accordance with a first feature of the invention, the commutator and brushes are relocated from the conventional position to the end of the rotor shaft spaced from its driving end and closer to the plain bearing. This permits the coil windings and permanent magnets to be moved closer to the antifriction bearing.

In spite of the emphasis of the use of combined plane and antifriction bearings, the two principal references relied on by the Examiner fail to disclose such a relationship. The Examiner in his rejection on DeBello claims that the bearing identified by the reference numeral 28 is a plane bearing. Clearly his FIG. 2 shows otherwise and the specification at column 4, lines 39 and 40 identify it as a "ball bearing". Thus the rejection of anticipation is not supported.

The same is true as to the rejection based on Nagashima et al. The corresponding bearing in this reference is not described, but clearly a roller or needle bearing is illustrated. Thus a rejection of the claim under 35 USC 102 is not supported.

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If these important features are not enough to show the rejection is fatally defective there are more distinctions. For example, both claims 1 and 16 require "said drive portion extending through said first end cap, said first end cap having attachment means for providing a mounting connection to a body that journals the another shaft". The other shaft is the shaft of the engine being started.

Considering first DeBello, the anti friction bearing at the engine end is supported by the element 44 which the reference characterizes as a "center plate", see column 4, lines 64 and 65. In addition the shaft journaled by the bearing 46 does not extend beyond the housing for connection to the engine shaft but is enclosed what is called a "drive end housing", see column 4 line 15.

In a like manner in Nagashima et al the starter motor shaft end 2b is enclosed in the end plate 1a rather than extending through it. Thus the Examiner has totally failed to make out a prima facie case of anticipation of either independent claim on either reference. Also at the sake of repetition, it should be again noted that neither reference addresses the problems solved by appellant.

Dependent claims 10-13 and 17 are also alleged by the Examiner to be anticipated by Nagashima et al. In addition to those distinctions spelled out above, claim 10-13 call for the brush carrier to be affixed to the second end cap. The structure at the right hand side of the sole figure of this reference may show a commutator and brush, but this also might be speculation. More importantly, appellants disclosure can not be inferred into the reference in the absence of a clear teaching since the rejection is based on 35 USC 102 not 103.

In addition, the cantilevered mounting of conventional starter motors also gives rise to considerable vibrational loads and resulting stresses on the plain bearing. Thus in accordance with a further feature of the invention, the second end cap is formed with reinforcing ribs and an arrangement that permits its direct attachment to the body of the engine being started in addition to the first end cap. This is emphasized in claims 12 and 13.

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Claims 12 and 13 depend on claim 11 and thus incorporate the distinguishing features of that claim. In addition these two claims, that stand or fall together, call for the second end closure to be "affixed to a body that journals the another shaft". This being the engine being started. The Examiner alleges that this limitation is met since both end caps are fixed together. However the claim requires the attachment to the body and the attachment between the end caps is recited separately in earlier claims upon which these claims depend and thus the Examiner can not apply such a double recitation in his rejection under 36 USC 102.

Claims 14, 15 18, 19 and 30 add a feature to the claims upon which they depend which has not yet been addressed. This is the feature that the end cap that carries the plain bearing is formed with stiffening ribs in the area around the bearing where the fasteners that fix the end caps in closing and sandwiching relation to the shell pass. These claims have been rejected on the combination of Nagashima et al in view of Isozumi.

The Examiner states that this added reference shows "stiffening ribs 21a". Again, however, he is attempting to read appellants invention into the reference. Isozumi utilizes a resinous end bracket and utilizes a pair of metal plates 22 to spread the compressive load over a greater area. The ribs 21a are designed with the sole purpose of preventing the plates 22 from being displaced when the fasteners are being tightened (column 4, lines 1-4). Since this reference is concerned with load distribution if the ribs 21a were to provide any strength for the bearing it would have stated this. Thus it is submitted that this combination does not teach the feature being claimed. It also lacks any disclosure from Isozumi that the allegedly reinforced end plate is affixed to the engine body directly.

Claims 23-25 are rejected on the combination of Nagashima et al in view of Isozumi, as applied against claim 19 in further view of US Patent 4,618,790 (Kakuda et al). These claims bring in to the claims upon which they depend the details of the brush assembly that facilitates assembly and equalization of the bearing loading. It should be remembered that the Nagashima et al reference discloses no detail whatsoever of the brushes. Kakuda et al relates to a totally different form of motor and there is no reason whatsoever that one skilled in the art would utilize this teaching in the type of motor shown Nagashima et al. Only an attempt to build the claim language from isolated and unrelated references would result in such a combination. These claims do not stand or fall together, but since the basic rejection is so faulty it is not believed necessary to further occupy the Boards time with what is believed to be unnecessary argument.


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Claims 26-29 are rejected on the combination of Nagashima et al in view of Isozumi and Kakuda et al as applied against claim 25 in further view of Hefner. These claims add to claim 25 the characterization of the magnets which are of a material that further adds to the bearing loading. Again it is submitted that this rejection is again only an attempt to build the claim language from isolated and unrelated references. These claims do not stand or fall together, but since the basic rejection is so faulty it is not believed necessary to further occupy the Boards time with what is believed to be unnecessary argument.

Thus it is most respectfully submitted that the Examiner's several rejections all fail to make out a prima facie case of either anticipation or obviousness, in fact to the contrary emphasize appellants inventive features, and reversal of all of the rejections is solicited.

Respectfully submitted:



Ernest A. Beutler
Reg. No. 19901

Phone (949) 721- 1182
Pacific Time

No additional Fee is required as the Brief Fee has already been paid

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APPENDIX
CLEAN COPY OF CLAIMS ON APPEAL

1. A rotating electrical machine comprised of an outer housing assembly and a rotor including a rotor shaft journaled therein, said rotor shaft having a drive portion extending outwardly beyond said outer housing assembly for driving relation with another shaft, said outer housing assembly being comprised of a stator shell closed at opposite ends thereof by first and second end caps, said first end cap providing an anti-friction bearing journaling said rotor shaft adjacent said drive portion with said drive portion extending through said first end cap, said first end cap having attachment means for providing a mounting connection to a body that journals the another shaft, said stator shell carrying a plurality of permanent magnets, said rotor having a plurality of windings cooperating with said permanent magnets, a commutator fixed to said rotor shaft at an end thereof spaced from said drive portion of said rotor shaft and in electrical communication with said rotor windings, fasteners for affixing said end caps to each other and to opposite ends of said stator shell, a brush carrier fixed to said stator shell and carrying brushes cooperating with said commutator, and a plain bearing carried by said second end cap for journaling the end of said rotor shaft spaced from said drive portion.

10. A rotating electrical machine as set forth in claim 1 wherein the end caps are fixed to each other by threaded fasteners and the stator shell is sandwiched therebetween.

11. A rotating electrical machine as set forth in claim 10 wherein the brush carrier is fixed to the second end cap.

12. A rotating electrical machine as set forth in claim 11 wherein the second end cap is affixed to a body that journals the another shaft.

13. A rotating electrical machine as set forth in claim 12 wherein the machine comprises a starter motor for starting an internal combustion engine and the another shaft comprises a shaft associated with said engine.

14. A rotating electrical machine as set forth in claim 10 wherein the second end cap is formed with stiffening ribs in the area of the plane bearing to minimize distortion loads thereon from the threaded fasteners.

15. A rotating electrical machine as set forth in claim 14 wherein the second end cap is formed with a mounting bracket that is affixed to a body that journals the another shaft and at least some of the stiffening ribs are integral with said mounting bracket.

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16. A rotating electrical machine comprised of an outer housing assembly and a rotor including a rotor shaft journaled therein, said rotor shaft having a drive portion extending outwardly beyond said outer housing assembly for driving relation with another shaft, said outer housing assembly being comprised of a stator shell closed at opposite ends thereof by first and second end caps, said first end cap providing an anti-friction bearing journaling said rotor shaft adjacent said drive portion with said drive portion extending through said first end cap, said first end cap having attachment means for providing a mounting connection to a body that journals the another shaft, said stator shell carrying a plurality of permanent magnets, said rotor having a plurality of windings cooperating with said permanent magnets, a commutator fixed to said rotor shaft in electrical communication with said rotor windings, fasteners for affixing said end caps to each other and to opposite ends of said stator shell, a brush carrier fixed to said stator shell and carrying brushes cooperating with said commutator, and a plain bearing carried by said second end cap for journaling the end of said rotor shaft spaced from said drive portion.

17. A rotating electrical machine as set forth in claim 16 wherein the end caps are fixed to each other by threaded fasteners and the stator shell is sandwiched therebetween.

18. A rotating electrical machine as set forth in claim 17 wherein the second end cap is formed with stiffening ribs in the area of the plane bearing to minimize distortion loads thereon from the threaded fasteners.

19. A rotating electrical machine as set forth in claim 18 wherein the second end cap is formed with a mounting bracket that is affixed to a body that journals the another shaft and at least some of the stiffening ribs are integral with said mounting bracket.

23. A rotating electrical machine as set forth in claim 19 wherein the brush carrier carries a number of brushes all of which are confined in an area that encompasses not greater than 180° around the rotational axis of the rotor shaft.

24. A rotating electrical machine as set forth in claim 23 wherein the brushes are confined in an area that encompasses 90° around the rotational axis of the rotor shaft.

25. A rotating electrical machine as set forth in claim 23 wherein the brush carrier carries two brushes. 26. A rotating electrical machine as set forth in claim 25 wherein four permanent magnets are fixed to the stator shell.

27. A rotating electrical machine as set forth in claim 26 wherein the permanent magnets are formed from a high magnetic density material.

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28. A rotating electrical machine as set forth in claim 27 wherein the high magnetic density material comprises neodymium-iron-boron.

29. A rotating electrical machine as set forth in claim 28 wherein the brushes are confined in an area that encompasses 90° around the rotational axis of the rotor shaft.

30. A rotating electrical machine as set forth in claim 19 wherein the machine comprises a starter motor for starting an internal combustion engine and the another shaft comprises a shaft associated with said engine.